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PHENOLOGY SATELLITE EXPERIMENT
ERTS-A Proposal No. MMC 159

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E7.2-10351
CR-129664

Progress Report for Period 10/8/72 - 12/8/72

The analysis of ERTS data has been hampered by the following: a) long delays in receiving images specified on the original product order forms, b) only a few data tapes specified in the original product order forms were received and these were sent to the wrong institution, and c) no data received in answer to newest product order requests.

Analysis of ERTS data received has been complicated by the extensive cloud cover over the test sites of the Appalachian and Mississippi Corridors.

Accomplishments during this reporting period include:

A. The development of a cataloging and filing system for ERTS photographic data with screening to determine the degree of cloudiness over the test sites. Cloud-free imagery (MSS bands 4, 5 and 7), of some of the sites in the Mississippi and Appalachian Corridors have been used to make color composites. This work was done at the Manned Space Center, Houston using an I²S Model 600 Digicol Processor.

B. Ground observation photography was initiated at the sites in the Rocky Mountain and Columbia River Valley Corridors. Photographs are being taken of (1) rangeland, (2) dryland winter wheat, and (3) irrigated hay (usually alfalfa).

C. Time sequences of photography depicting fall senescence of forest stands and crops in the Appalachian and Mississippi Corridor sites have been selected for further study.

D. The Field Guide for Ground Observations (Western Region) was distributed to the cooperators.

E. A system was devised by LARS for locating the phenology test sites within a frame of ERTS imagery. During this period 67 frames of ERTS imagery from 14 test sites were received. After evaluating these images for cloud cover, 37 frames of CCT's were ordered. Of all the ERTS imagery received to date on standing order, approximately 30 frames, some dating back to August, are yet to be received. One technician is in training now for use of the LARSYS data processing programs. Spectral analysis of the ERTS-MSS data over the test sites of the Appalachian and Mississippi Corridors will begin after January 1, 1973.

(E72-10351) PHENOLOGY SATELLITE
EXPERIMENT Progress Report, 8 Oct. - 8
Dec. 1972 B.E. Dethier (Cornell Univ.)
8 Dec. 1972 3 p

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N73-14339

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F. Data from ten sites are currently under investigation at Texas A & M. Six of these sites are in the Rocky Mountain Corridor and four are in the Columbia Valley. Thirty-nine pieces of 9.5 inch black and white positive transparencies produced from MSS band 5 have been received as a result of a standing order at NASA. The images correspond to the original product order forms and do not agree with the newest orders. These images are system corrected images from 5 overpasses. Digital tapes are being ordered separately.

A computer program has been developed to process data from a near rectangular site lying entirely within a single frame. Input for the program consists of the tapes and a site description card giving the latitude and longitude of the site center and its dimensions in miles. A subprogram calculates which scan lines cross the site and which cells within each scan line contain data from the site. It is assumed that the boundaries of the site are aligned with the orbital track of the satellite and the direction of sweep of the scanners so that, for efficiency in processing, a fixed length segment of each scan line intersecting the site is processed.

The main program then processes the data, calculating a mean intensity and a standard deviation for each spectral band and a covariance matrix for the 4 bands. Optionally, the data from any of the spectral bands can be stored on disk suitable for further processing (e.g., grey-scale maps of the site).

A set of four data tapes covering the area around Pyramid Lake, Nevada is being used in testing the program. The software processes the data correctly, however, the sites cannot be located by longitude-latitude inputs with sufficient accuracy at this time. The difficulty may be in the model used to determine the direction of the orbital track or it may be that the data used to calculate the direction of the track is not sufficiently accurate. Assistance has been sought from cognizant NASA personnel at Goddard SFC and it is anticipated that the problem will soon be rectified.

Analyses of frames E-1096-15063 and E-1079-15115 which included areas around Richmond, Vermont were completed. Categories identified included northern hardwood forests, unharvested and harvested corn fields, and pastureland. These results were significant in that they indicate that ERTS data can be used to identify phenological events (senescence/leaf coloration, leaf fall) and maturation and harvesting of certain field crops.

Publications and Papers:

Ashley, M. "Operation Greenwave", Mapping Phenology Changes using ERTS-A Satellite Imagery. Paper presented at the 64th Annual Meeting Canadian Institute of Forestry, Frederickton, N.B., Aug. 25-30, 1972.

Caprio, J. M., D. R. Bourdeau, and L. Lancaster. Phenology Satellite Experiment, Field Guide for Ground Observations (Western Region).

No operational changes are recommended.

A list by date of any changes in standing order forms: Changes were submitted on November 17, 1972.

A listing by date of any Data Request Forms (retrospective data):
Retrospective data request submitted November 17, 1972.

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